

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

\* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The plastic-molded-type semiconductor device characterized by providing the following. The semiconductor die possessing the 1st front face which has two or more terminal pads, and the 2nd front face of the opposite side. The heat sink with which the 1st front face and the 2nd front face of the opposite side parallel to this 1st front face are provided, and the 2nd front face of the aforementioned semiconductor die is attached in the 1st front face. Adhesion matter for attaching the 2nd front face of the aforementioned semiconductor die on the 1st front face of the aforementioned heat sink. the 1st conductor which is attached on the 1st front face of the aforementioned heat sink so that the circumference of the aforementioned semiconductor die may be surrounded, and is combined electrically to the 1st terminal pad of a semiconductor die -- with a ring this 1st conductor -- the 2nd conductor which is attached on the 1st front face of the aforementioned heat sink so that the circumference of a ring may be surrounded, and is combined electrically to the 2nd terminal pad of a semiconductor die -- with a ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink -- having -- the 2nd conductor of the above -- the method edge of inside [ adjoining a ring ] -- the 1st conductor of the above -- with the 1st conductive lead combined electrically to the ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink -- having -- the 2nd conductor of the above -- the method edge of inside [ adjoining a ring ] -- the 2nd conductor -- with the 2nd conductive lead combined electrically to the ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink -- having -- the 2nd conductor of the above -- while a ring is adjoined, a way edge with other conductive leads combined electrically to other terminal pads of the aforementioned semiconductor die the above -- a conductor -- with the insulating tape of adhesives covering for attaching a ring and the inner direction portion of the aforementioned lead on the 1st front face of the aforementioned heat sink the aforementioned semiconductor die, the aforementioned adhesion matter, and the above -- a conductor -- the closure matter which a ring and the inner direction portion of the aforementioned conductive lead are closed [ matter ], and exposes a way portion outside outside the aforementioned conductive lead

[Claim 2] The plastic-molded-type semiconductor device characterized by providing the following. The semiconductor die possessing the 1st front face which has two or more terminal pads, and the 2nd front face of the opposite side. The heat sink with which the 1st front face and the 2nd front face of the opposite side parallel to this 1st front face are provided, and the 2nd front face of the aforementioned semiconductor die is attached in the 1st front face. Adhesion matter for attaching the 2nd front face of the aforementioned semiconductor die on the 1st front face of the aforementioned heat sink. the 1st conductor which is attached on the 1st front face of the aforementioned heat sink so that the circumference of the aforementioned semiconductor die may be surrounded, and is combined electrically at either the power-terminal pad of a semiconductor die, or an earth terminal pad -- with a

ring this 1st conductor -- the 2nd conductor which is attached on the 1st front face of the aforementioned heat sink so that the circumference of a ring may be surrounded, and is combined electrically to another side of the power-terminal pad of the aforementioned semiconductor die, or an earth terminal pad -- with a ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink - - having -- the 2nd conductor of the above -- the method edge of inside [ adjoining a ring ] -- the 1st conductor of the above -- with the 1st conductive lead combined electrically to the ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink -- having -- the 2nd conductor of the above -- the method edge of inside [ adjoining a ring ] -- the 2nd conductor -- with the 2nd conductive lead combined electrically to the ring it has a method edge of inside, and a method edge of outside, and the inner direction portion which includes the method edge of inside attaches on the 1st front face of the aforementioned heat sink -- having -- the 2nd conductor of the above -- while a ring is adjoined, a way edge with other conductive leads combined electrically to other terminal pads of the aforementioned semiconductor die the above -- a conductor -- with the insulating tape of adhesives covering for attaching a ring and the inner direction portion of the aforementioned lead on the 1st front face of the aforementioned heat sink the aforementioned semiconductor die, the aforementioned adhesion matter, and the above -- a conductor -- the closure matter which a ring and the inner direction portion of the aforementioned conductive lead are closed [ matter ], and exposes a way portion outside outside the aforementioned conductive lead

[Claim 3] The manufacture method of the plastic-molded-type semiconductor device characterized by providing the following. the 1st conductor which surrounds central opening for placing a semiconductor die -- a ring this 1st conductor -- the 2nd conductor which surrounds a ring -- a ring this 2nd conductor -- a ring and the 1st conductor of the above -- the connector bar which connects a ring the 2nd conductor -- two or more leads arranged around a ring, and the 2nd conductor -- it arranges around a ring -- having -- the method edge of inside -- the 2nd conductor -- with two or more support bars connected with the ring The process which prepares the leadframe which has the external ring which connects between a lead and a support bar, The process which cuts the insulating tape of adhesives covering for attaching on this leadframe, the insulating tape of the aforementioned adhesives covering -- the aforementioned leadframe -- at least -- the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with the process joined on a ring, the aforementioned connector bar, and the inner direction portion of the aforementioned conductive lead The process which pierces the connector bar and support bar of the aforementioned leadframe with the aforementioned insulating tape, the process which pierces a metal plate and forms a heat sink, and in order to form a leadframe assembly So that the aforementioned insulating tape may be arranged between the aforementioned heat sink and the aforementioned leadframe The process which joins the aforementioned heat sink to the aforementioned insulating tape, and the process which joins a semiconductor die on the aforementioned heat sink, The process which joins the end of a bond wire to the various terminal pads of the aforementioned semiconductor die, the other end of a bond wire -- various leads and the 1st conductor of the above of the aforementioned leadframe -- a ring and the 2nd conductor of the above -- with the process joined to a ring the aforementioned semiconductor die and the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with a ring and the inner direction portion of the aforementioned conductive lead The process enclosed with the closure matter so that the aforementioned insulating tape and a bond wire may be closed and a way portion may be exposed outside outside the aforementioned conductive lead, and the process which cuts the aforementioned external ring and separates between way portions outside the aforementioned lead and the process which excises a way portion outside the aforementioned support bar.

[Claim 4] The manufacture method of the plastic-molded-type semiconductor device characterized by providing the following. the 1st conductor which surrounds central opening for placing a semiconductor die -- a ring this 1st conductor -- the 2nd conductor which surrounds a ring -- a ring this 2nd conductor -- a ring and the 1st conductor of the above -- the connector bar which connects a ring the 2nd conductor --

two or more leads arranged around a ring, and the 2nd conductor -- it arranges around a ring -- having -- the method edge of inside -- the 2nd conductor -- with two or more support bars connected with the ring The process which prepares the leadframe which has the external ring which connects between a lead and a support bar, The process which cuts the insulating tape of adhesives covering which has central opening for attaching on this leadframe, the insulating tape of the aforementioned adhesives covering -- the aforementioned leadframe -- at least -- the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with the process joined on a ring, the aforementioned connector bar, and the inner direction portion of the aforementioned conductive lead The process which pierces the connector bar and support bar of the aforementioned leadframe with the aforementioned insulating tape, the process which pierces a metal plate and forms a heat sink, and in order to form a leadframe assembly So that the aforementioned insulating tape may be arranged between the aforementioned heat sink and the aforementioned leadframe The process which joins the aforementioned heat sink to the aforementioned insulating tape, and the process which joins a semiconductor die on the aforementioned heat sink, The process which joins the end of a bond wire to the various terminal pads of the aforementioned semiconductor die, the other end of a bond wire -- various leads and the 1st conductor of the above of the aforementioned leadframe -- a ring and the 2nd conductor of the above -- with the process joined to a ring the aforementioned semiconductor die and the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with a ring and the inner direction portion of the aforementioned conductive lead The process enclosed with the closure matter so that the aforementioned insulating tape and a bond wire may be closed and a way portion may be exposed outside outside the aforementioned conductive lead, and the process which cuts the aforementioned external ring and separates between way portions outside the aforementioned lead and the process which excises a way portion outside the aforementioned support bar.

[Claim 5] The manufacture method of the plastic-molded-type semiconductor device characterized by providing the following. the 1st conductor which surrounds central opening for placing a semiconductor die -- a ring this 1st conductor -- the 2nd conductor which surrounds a ring -- a ring this 2nd conductor -- a ring and the 1st conductor of the above -- the connector bar which connects a ring the 2nd conductor -- two or more leads arranged around a ring, and the 2nd conductor -- it arranges around a ring -- having -- the method edge of inside -- the 2nd conductor -- with two or more support bars connected with the ring The process which prepares the leadframe which has the external ring which connects between a lead and a support bar, The process which cuts the insulating tape of adhesives covering for attaching on this leadframe, the insulating tape of the aforementioned adhesives covering -- the aforementioned leadframe -- at least -- the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with the process joined on a ring, the aforementioned connector bar, and the inner direction portion of the aforementioned conductive lead The process which pierces central opening of the aforementioned insulating tape for the connector bar and support bar of the aforementioned leadframe, the process which pierces a metal plate and forms a heat sink, and in order to form a leadframe assembly So that the aforementioned insulating tape may be arranged between the aforementioned heat sink and the aforementioned leadframe The process which joins the aforementioned heat sink to the aforementioned insulating tape, and the process which joins a semiconductor die on the aforementioned heat sink, The process which joins the end of a bond wire to the various terminal pads of the aforementioned semiconductor die, the other end of a bond wire -- various leads and the 1st conductor of the above of the aforementioned leadframe -- a ring and the 2nd conductor of the above -- with the process joined to a ring the aforementioned semiconductor die and the 1st conductor of the above -- a ring and the 2nd conductor of the above -- with a ring and the inner direction portion of the aforementioned conductive lead The process enclosed with the closure matter so that the aforementioned insulating tape and a bond wire may be closed and a way portion may be exposed outside outside the aforementioned conductive lead, the process which cuts the aforementioned external ring and separates between way portions outside the aforementioned lead, and the process which excises a way portion outside the aforementioned support bar.

[Translation done.]

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the structure and its manufacture method of a plastic-molded-type semiconductor device, especially the semiconductor device containing the heat sink for thermolysis.

[0002]

[Description of the Prior Art] The multilayer molding plastic package for containing the semiconductor die which has an integrated circuit in the official report of JP,63-246851,A is indicated. A plastic package has the power plane and grounding plane which were formed from the \*\*\*\* metal plate. A grounding plane is arranged above a power plane. In order to prepare opening for placing a semiconductor die, the center section of the grounding plane is pierced. In order to join insulating a power plane and a grounding plane electrically, the insulating tape covered with polyimide adhesives is used. In order to join a lead on a grounding plane, the insulating tape covered with the 2nd polyimide adhesives is used. After attaching a semiconductor die on a power plane through opening of a grounding plane, using a bond wire, the power-terminal pad of a semiconductor die is combined with a power plane, and an earth terminal pad is combined with a grounding plane. It becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of power supply leads and grounding leads by using a power plane and a grounding plane. By using a power plane and a grounding plane, a package becomes small and the mutual inductance during a lead decreases. However, manufacture takes many processes to the above-mentioned multilayer molding plastic package, and it has the trouble that a manufacturing cost can pull up.

[0003]

[Problem(s) to be Solved by the Invention] this invention -- a power supply -- a conductor -- a ring and grounding -- a conductor -- it enables it to form a ring with monolayer structure By it, decreasing the mutual inductance during a lead, a package is miniaturized, manufacture is made easy and a manufacturing cost is reduced.

[0004]

[Means for Solving the Problem] the power supply in which the semiconductor device of this invention was formed from the \*\*\*\* metal plate of one sheet -- a conductor -- a ring and grounding -- a conductor -- it has a ring grounding -- a conductor -- a ring -- a power supply -- a conductor -- it is arranged on the outside so that a ring may be surrounded opening for placing a semiconductor die -- a power supply -- a conductor -- it is prepared inside a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- in order to join insulating a ring and a lead electrically to a heat sink, the insulating tape covered with polyimide adhesives is used a semiconductor die -- a power supply -- a conductor -- since it attaches on a heat sink through opening of a ring -- a bond wire -- using -- the power-terminal pad of a semiconductor die -- a power supply -- a conductor -- a ring -- an earth terminal pad -- grounding -- a conductor -- it combines with a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- it becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of

power supply leads and grounding leads by using a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- by using a ring, a package becomes small and an inductance mutual [ between leads ] decreases a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring is formed on the leadframe of one sheet, manufacture is easy, and a package serves as a thin shape a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring adjoins a coplanar and is arranged, a noise can be decreased

[0005]

[Embodiments of the Invention] The form of operation of this invention is explained with reference to a drawing. Drawing 1 is the perspective diagram which cut and lacked the part which shows the semiconductor device 1 based on this invention. It is equipped with the semiconductor die 2 on the heat sink 4 by the proper thermally conductive adhesives 3. Two or more leads 5 and the support bar 6 are arranged around the heat sink 4 the outline radial. Although the semiconductor device which has lead 5 in all four flanks was shown in drawing, four this inventions are applicable also to the semiconductor device which has lead 5 in a few flank. the circumference of the semiconductor die 2 -- the 1st conductor -- the power supply which is a ring -- a conductor -- a ring 7 arranges -- having -- further -- a power supply -- a conductor -- the circumference of a ring 7 -- the 2nd conductor -- grounding which is a ring - a conductor -- the ring 8 is arranged lead 5, the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8 makes the insulating tape 9 covered with adhesives like a polyimide intervene, and is supported on the heat sink 4 The bond wire 10 has connected each inside edge of lead 5 to the terminal pad 11 with which it was chosen on the semiconductor die 2. the bond wire 12 -- a power supply -- a conductor -- the ring 7 is connected to other terminal pads 11 with which it was chosen on the semiconductor die 2 moreover, the bond wire 13 -- grounding -- a conductor -- the ring 8 is connected to other terminal pads 11 with which it was chosen on the semiconductor die 2 the bond wire 14 -- a power supply -- a conductor -- it has connected with the inside edge of the lead 5 which had the ring 7 chosen the bond wire 15 -- grounding -- a conductor -- it has connected with the inside edge of other leads 5 which had the ring 8 chosen The closure matter 16 encloses a heat sink 4, the semiconductor die 2, the bond wires 10, 12, 13, 14, and 15, the inside portion of lead 5, and the support bar 6. Although it is not visible all over drawing, the near side in which the semiconductor die 2 of a heat sink 4 is not attached is exposed to the exterior of the closure matter 16.

[0006] The semiconductor device 1 shown in drawing 1 is manufactured by the method explained below to a profile. the lead 5 of plurality [ drawing 2 ], the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- it is the perspective diagram showing the leadframe 17 which has a ring 8, and an insulating tape 9 a square power supply -- a conductor -- the ring 7 offers the boundary with the central opening 18 of the square for placing the semiconductor die 2 a power supply -- a conductor -- grounding of the square which surround a ring 7 -- a conductor -- a ring 8 -- four corners -- setting -- the connector bar 19 -- a power supply -- a conductor -- it connects with a ring 7 and is supported with the support bar 6 The lead 5 and the support bar 6 are held by the external ring 20 in the predetermined position. Since a lead is constituted, a leadframe 17 is manufactured from various kinds of metals known well conventionally. A leadframe 17 is common and is manufactured by punching or etching from a desired metal plate. the power supply of illustration -- a conductor -- a ring 7 and grounding -- a conductor -- although the configuration of a ring 8, opening 18, and the external ring 20 is a square mostly, any configurations are arbitrary and the configuration is determined by the configuration of the semiconductor die put on the interior

[0007] An insulating tape 9 pierces the synthetic-resin tape of the electric insulation covered with polyimide adhesives etc., and is manufactured. The size concerning the inner direction portion of lead 5 is annular [ square ] mostly, and the insulating tape 9 is equipped with the central opening 21 of a simultaneously square slightly smaller than the opening 18 of a leadframe 17. an insulating tape 9 -- the inner direction portions of the lead 5 of a leadframe 17, and the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- one field of a ring 8 is pasted Drawing 3 shows signs that adhesion with a leadframe 17 and an insulating tape 9 was completed.

[0008] Next, drawing 4 is referred to. Opening 22 is formed by piercing simultaneously some insulating

tapes 9 and the connection bar 19 of a leadframe 17. the connection bar 19 is removed -- a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8 is separated mutually In addition, the central opening 21 of an insulating tape 9 can be simultaneously formed at the time of formation of this opening 22.

[0009] Drawing 5 is the perspective diagram showing the leadframe 17 from which the insulating tape 9 pasted up and the connection bar 19 was removed, and a heat sink 4. A heat sink 4 carries out press forming of the thermally conductive good metal plates, such as aluminum, and is manufactured. A heat sink 4 is a little larger simultaneously square than an insulating tape 9, and has the 1st front face 23 and the 2nd front face 24 of the opposite side. The 1st front-face 23 side of a heat sink 4 pastes an insulating tape 9 so that opening 21 may be plugged up. The leadframe assembly 25 is formed in this stage of manufacture. Drawing 6 and drawing 7 show the leadframe assembly 25 formed by unifying three persons of a leadframe 17, an insulating tape 9, and a heat sink 4.

[0010] Next, drawing 8 is referred to. The semiconductor die 2 is carried on the front face 23 of the heat sink 4 in the leadframe assembly 25. The semiconductor die 2 has a front face 26 and the front face 27 of the opposite side. On the front face 26, two or more terminal pads 11 are formed. A front face 27 pastes up on the front face 23 of a heat sink 4 by thermally conductive adhesives 3 grade. terminal pad 11a for power supplies -- a power supply -- a conductor -- in order to connect with a ring 7, the bond wire 12 is used a power supply -- a conductor -- in order to connect a ring 7 to lead 5a for power supplies, the bond wire 14 is used terminal pad 11b for grounding -- grounding -- a conductor -- in order to connect with a ring 8, another bond wire 13 is used grounding -- a conductor -- in order to connect a ring 8 to lead 5b for grounding, the bond wire 15 is used Other terminal pads 11 are connected to other various leads 5 using another bond wire 10. in addition, a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- arrangement of a ring 8 can be made reverse

[0011] Next, drawing 9 is referred to. Arrange in the mould cavity of the mould assembly which does not illustrate the leadframe assembly 25 which carried the semiconductor die 2, and it is filled up with the closure matter 16. a heat sink 4, the semiconductor die 2, the inner direction portion of the conductive lead 5, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8, an insulating tape 9, and the bond wires 10, 12, 13, and 14 are closed, and a way portion is exposed outside outside a way portion and the support bar 6 outside the front face 24 of a heat sink 4, and the conductive lead 5 After the closure matter 16 carries out cooling solidification, a ring 20 is excised outside a leadframe 17, each lead 5 and the support bar 6 become independent, and each lead 5 of a semiconductor device 1 is formed. The support bar 6 does not extend to the outside of the closure matter 16. A way portion can be made crooked outside the lead 5 which extended to the outside of the closure matter 16 if needed.

[0012]

[Effect of the Invention] as mentioned above, the power supply formed from the \*\*\*\* metal plate of one sheet in this invention -- a conductor -- a ring and grounding -- a conductor -- it is using a ring and it becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of power supply leads and grounding leads a power supply -- a conductor -- a ring and grounding -- a conductor -- by using a ring, a package becomes small and the inductance between leads decreases a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring is formed on the leadframe of one sheet, manufacture is easy, and a package serves as a thin shape a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring adjoins a coplanar and is arranged, a noise can be decreased

[Translation done.]



**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**TECHNICAL FIELD**

---

[The technical field to which invention belongs] This invention relates to the structure and its manufacture method of a plastic-molded-type semiconductor device, especially the semiconductor device containing the heat sink for heat dissipation.

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

**PRIOR ART**

[Description of the Prior Art] The multilayer molding plastic package for containing the semiconductor die which has an integrated circuit in the official report of JP,63-246851,A is indicated. A plastic package has the power plane and grounding plane which were formed from the \*\*\*\* metal plate. A grounding plane is arranged above a power plane. In order to prepare opening for placing a semiconductor die, the center section of the grounding plane is pierced. In order to join insulating a power plane and a grounding plane electrically, the insulating tape covered with polyimide adhesives is used. In order to join a lead on a grounding plane, the insulating tape covered with the 2nd polyimide adhesives is used. After attaching a semiconductor die on a power plane through opening of a grounding plane, using a bond wire, the power-terminal pad of a semiconductor die is combined with a power plane, and an earth terminal pad is combined with a grounding plane. It becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of power supply leads and grounding leads by using a power plane and a grounding plane. By using a power plane and a grounding plane, a package becomes small and the mutual inductance during a lead decreases. However, manufacture takes many processes to the above-mentioned multilayer molding plastic package, and it has the trouble that a manufacturing cost can pull up.

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

**EFFECT OF THE INVENTION**

[Effect of the Invention] as mentioned above, the power supply formed from the \*\*\*\* metal plate of one sheet in this invention -- a conductor -- a ring and grounding -- a conductor -- it is using a ring and it becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of power supply leads and grounding leads a power supply -- a conductor -- a ring and grounding -- a conductor -- by using a ring, a package becomes small and the inductance between leads decreases a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring is formed on the leadframe of one sheet, manufacture is easy, and a package serves as a thin shape a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring adjoins a coplanar and is arranged, a noise can be decreased

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**TECHNICAL PROBLEM**

---

[Problem(s) to be Solved by the Invention] this invention -- a power supply -- a conductor -- a ring and grounding -- a conductor -- it enables it to form a ring with monolayer structure By it, decreasing the mutual inductance during a lead, a package is miniaturized, manufacture is made easy and a manufacturing cost is reduced.

[Translation done.]

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## MEANS

[Means for Solving the Problem] the power supply in which the semiconductor device of this invention was formed from the \*\*\*\* metal plate of one sheet -- a conductor -- a ring and grounding -- a conductor -- it has a ring grounding -- a conductor -- a ring -- a power supply -- a conductor -- it is arranged on the outside so that a ring may be surrounded opening for placing a semiconductor die -- a power supply -- a conductor -- it is prepared inside a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- in order to join insulating a ring and a lead electrically to a heat sink, the insulating tape covered with polyimide adhesives is used a semiconductor die -- a power supply -- a conductor -- since it attaches on a heat sink through opening of a ring -- a bond wire -- using -- the power-terminal pad of a semiconductor die -- a power supply -- a conductor -- a ring -- an earth terminal pad -- grounding -- a conductor -- it combines with a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- it becomes unnecessary to connect a power-terminal pad and an earth terminal pad to various kinds of power supply leads and grounding leads by using a ring a power supply -- a conductor -- a ring and grounding -- a conductor -- by using a ring, a package becomes small and an inductance mutual [ between leads ] decreases a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring is formed on the leadframe of one sheet, manufacture is easy, and a package serves as a thin shape a power supply -- a conductor -- a ring and grounding -- a conductor -- since a ring adjoins a coplanar and is arranged, a noise can be decreased

[0005]

[Embodiments of the Invention] The gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is the perspective diagram which cut and lacked the part which shows the semiconductor device 1 based on this invention. It is equipped with the semiconductor die 2 on the heat sink 4 by the proper thermally conductive adhesives 3. Two or more leads 5 and the support bar 6 are arranged around the heat sink 4 the profile radial. Although the semiconductor device which has lead 5 in all four flanks was shown in drawing, four this inventions are applicable also to the semiconductor device which has lead 5 in a few flank. the circumference of the semiconductor die 2 -- the 1st conductor -- the power supply which is a ring -- a conductor -- a ring 7 arranges -- having -- further -- a power supply -- a conductor -- the circumference of a ring 7 -- the 2nd conductor -- grounding which is a ring -- a conductor -- the ring 8 is arranged lead 5, the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8 makes the insulating tape 9 covered with adhesives like a polyimide intervene, and is supported on the heat sink 4 The bond wire 10 has connected each inside edge of lead 5 to the terminal pad 11 with which it was chosen on the semiconductor die 2. the bond wire 12 -- a power supply -- a conductor -- the ring 7 is connected to other terminal pads 11 with which it was chosen on the semiconductor die 2 moreover, the bond wire 13 -- grounding -- a conductor -- the ring 8 is connected to other terminal pads 11 with which it was chosen on the semiconductor die 2 the bond wire 14 -- a power supply -- a conductor -- it has connected with the inside edge of the lead 5 which had the ring 7 chosen the bond wire 15 -- grounding -- a conductor -- it has connected with the inside edge of other leads 5 which had the ring 8 chosen The closure matter 16 encloses a heat sink 4, the semiconductor die 2, the bond wires 10, 12, 13, 14, and 15, the inside portion of lead 5, and the

support bar 6. Although it is not visible all over drawing, the near side in which the semiconductor die 2 of a heat sink 4 is not attached is exposed to the exterior of the closure matter 16.

[0006] The semiconductor device 1 shown in drawing 1 is manufactured by the method explained below to a profile. the lead 5 of plurality [ drawing 2 ], the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- it is the perspective diagram showing the leadframe 17 which has a ring 8, and an insulating tape 9 a square power supply -- a conductor -- the ring 7 offers the boundary with the central opening 18 of the square for placing the semiconductor die 2 a power supply -- a conductor -- grounding of the square which surround a ring 7 -- a conductor -- a ring 8 -- four corners -- setting -- the connector bar 19 -- a power supply -- a conductor -- it connects with a ring 7 and is supported with the support bar 6 The lead 5 and the support bar 6 are held by the external ring 20 in the predetermined position. Since a lead is constituted, a leadframe 17 is manufactured from various kinds of metals known well conventionally. A leadframe 17 is common and is manufactured by punching or etching from a desired metal plate. the power supply of illustration -- a conductor -- a ring 7 and grounding -- a conductor -- although the configuration of a ring 8, opening 18, and the external ring 20 is a square mostly, any configurations are arbitrary and the configuration is determined by the configuration of the semiconductor die put on the interior

[0007] An insulating tape 9 pierces the synthetic-resin tape of the electric insulation covered with polyimide adhesives etc., and is manufactured. The size concerning the inner direction portion of lead 5 is annular [ square ] mostly, and the insulating tape 9 is equipped with the central opening 21 of a simultaneously square slightly smaller than the opening 18 of a leadframe 17. an insulating tape 9 -- the inner direction portions of the lead 5 of a leadframe 17, and the support bar 6, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- one field of a ring 8 is pasted Drawing 3 shows signs that adhesion with a leadframe 17 and an insulating tape 9 was completed.

[0008] Next, drawing 4 is referred to. Opening 22 is formed by piercing simultaneously some insulating tapes 9 and the connection bar 19 of a leadframe 17. the connection bar 19 is removed -- a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8 is separated mutually In addition, the central opening 21 of an insulating tape 9 can be simultaneously formed at the time of formation of this opening 22.

[0009] Drawing 5 is the perspective diagram showing the leadframe 17 from which the insulating tape 9 pasted up and the connector bar 19 was removed, and a heat sink 4. A heat sink 4 carries out press forming of the thermally conductive good metal plates, such as aluminum, and is manufactured. A heat sink 4 is a little larger simultaneously square than an insulating tape 9, and has the 1st front face 23 and the 2nd front face 24 of the opposite side. The 1st front-face 23 side of a heat sink 4 pastes an insulating tape 9 so that opening 21 may be plugged up. The leadframe assembly 25 is formed in this stage of manufacture. Drawing 6 and drawing 7 show the leadframe assembly 25 formed by unifying three persons of a leadframe 17, an insulating tape 9, and a heat sink 4.

[0010] Next, drawing 8 is referred to. The semiconductor die 2 is carried on the front face 23 of the heat sink 4 in the leadframe assembly 25. The semiconductor die 2 has a front face 26 and the front face 27 of the opposite side. On the front face 26, two or more terminal pads 11 are formed. A front face 27 pastes up on the front face 23 of a heat sink 4 by thermally conductive adhesives 3 grade. terminal pad 11a for power supplies -- a power supply -- a conductor -- in order to connect with a ring 7, the bond wire 12 is used a power supply -- a conductor -- in order to connect a ring 7 to lead 5a for power supplies, the bond wire 14 is used terminal pad 11b for grounding -- grounding -- a conductor -- in order to connect with a ring 8, another bond wire 13 is used grounding -- a conductor -- in order to connect a ring 8 to lead 5b for grounding, the bond wire 15 is used Other terminal pads 11 are connected to other various leads 5 using another bond wire 10. in addition, a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- arrangement of a ring 8 can be made reverse

[0011] Next, drawing 9 is referred to. Arrange in the mould cavity of the mould assembly which does not illustrate the leadframe assembly 25 which carried the semiconductor die 2, and it is filled up with the closure matter 16. a heat sink 4, the semiconductor die 2, the inner direction portion of the conductive lead 5, and a power supply -- a conductor -- a ring 7 and grounding -- a conductor -- a ring 8,

an insulating tape 9, and the bond wires 10, 12, 13, and 14 are closed, and a way portion is exposed outside outside a way portion and the support bar 6 outside the front face 24 of a heat sink 4, and the conductive lead 5 After the closure matter 16 carries out cooling solidification, a ring 20 is excised outside a leadframe 17, each lead 5 and the support bar 6 become independent, and each lead 5 of a semiconductor device 1 is formed. The support bar 6 does not extend to the outside of the closure matter 16. A way portion can be made crooked outside the lead 5 which extended to the outside of the closure matter 16 if needed.

---

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

**DESCRIPTION OF DRAWINGS**

**[Brief Description of the Drawings]**

[Drawing 1] It is the perspective diagram which cut and lacked the part which shows the semiconductor device 1 based on this invention.

[Drawing 2] It is the perspective diagram showing the insulating tape covered with a leadframe and adhesives.

[Drawing 3] They are some plans showing the state where the insulating tape was pasted up on the leadframe.

[Drawing 4] They are some plans after piercing the connector bar from a leadframe.

[Drawing 5] It is the perspective diagram of a leadframe and a heat sink which pasted up the insulating tape.

[Drawing 6] It is the plan which cut and lacked a part of leadframe assembly.

[Drawing 7] It is a VII-VII cross section in drawing 6 .

[Drawing 8] It is the perspective diagram showing some of [ which carried the semiconductor die / a part of leadframe assembly and some of connection of a terminal ].

[Drawing 9] It is the cross section of the completed semiconductor device.

**[Description of Notations]**

- 1 Semiconductor Device
- 2 Semiconductor Die
- 3 Thermally Conductive Adhesives
- 4 Heat Sink
- 5 Lead
- 5a The lead for power supplies
- 5b The lead for grounding
- 6 Support Bar
- 7 Power Supply -- Conductor -- Ring
- 8 Grounding -- Conductor -- Ring
- 9 Insulating Tape
- 10 Bond Wire
- 11 Terminal Pad
- 11a The terminal pad for power supplies
- 11b The terminal pad for grounding
- 12 Bond Wire
- 13 Bond Wire
- 14 Bond Wire
- 15 Bond Wire
- 16 Closure Matter
- 17 Leadframe
- 18 Opening



19 Connector Bar  
20 External Ring  
21 Opening  
22 Opening  
23 1st Front Face  
24 2nd Front Face  
25 Leadframe Assembly  
26 1st Front Face  
27 2nd Front Face

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

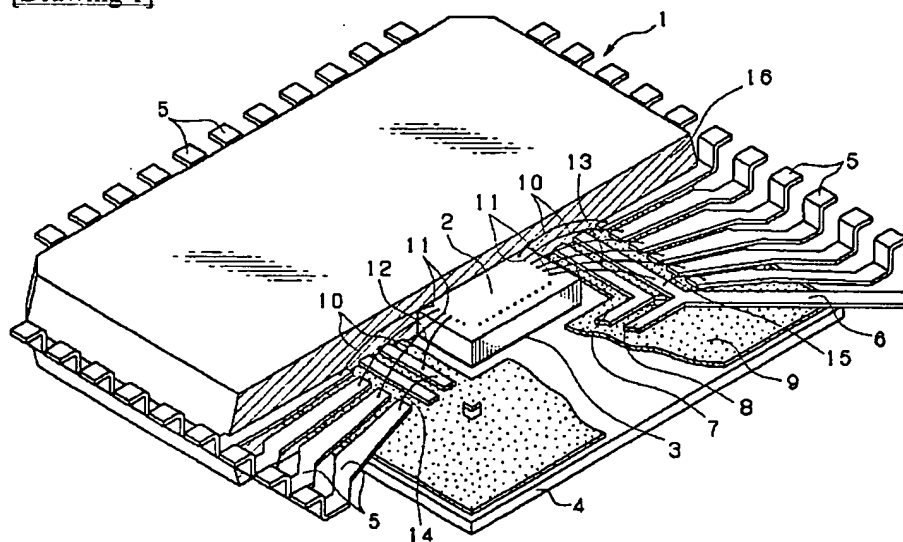
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

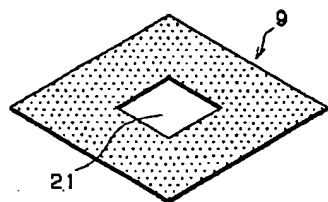
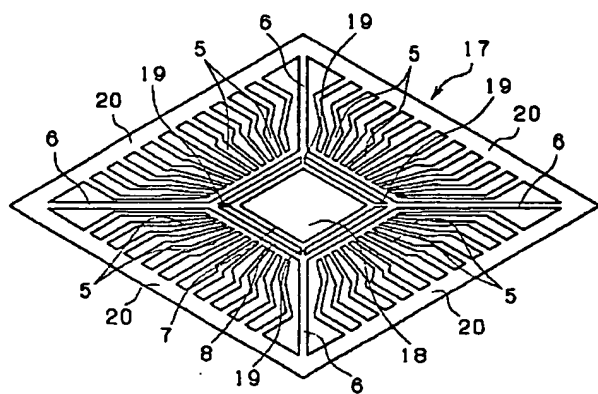
**DRAWINGS**

---

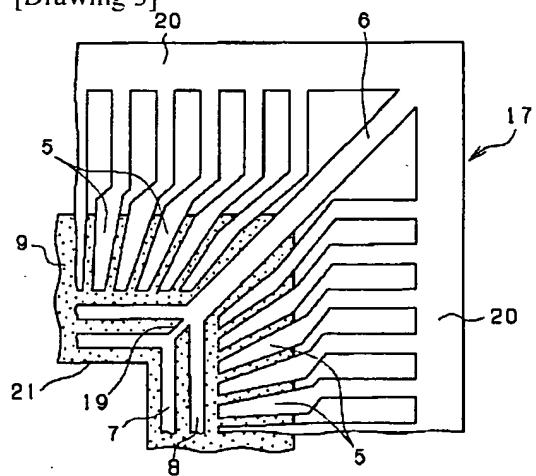
[Drawing 1]



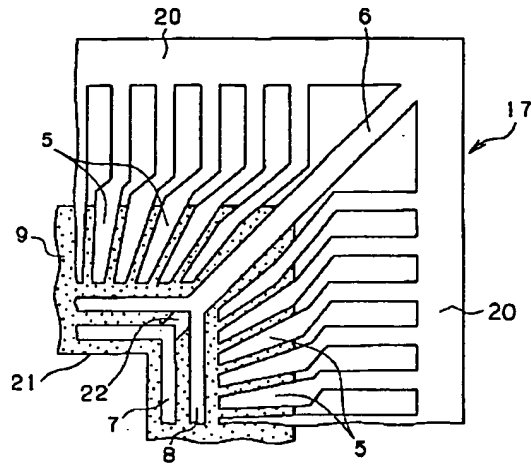
[Drawing 2]



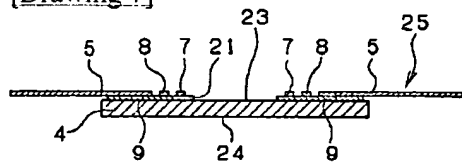
[Drawing 3]



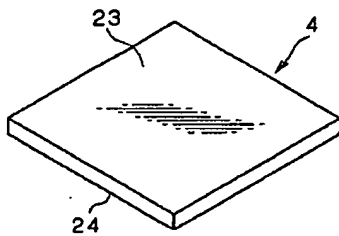
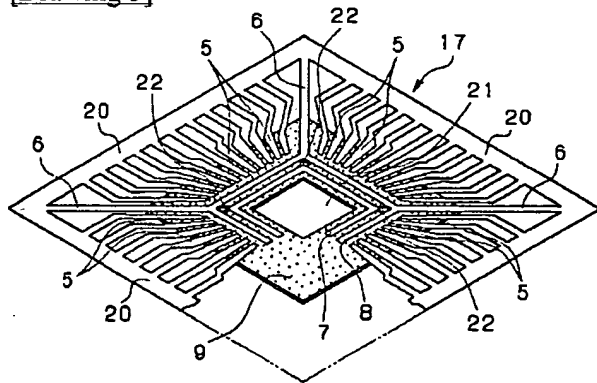
[Drawing 4]



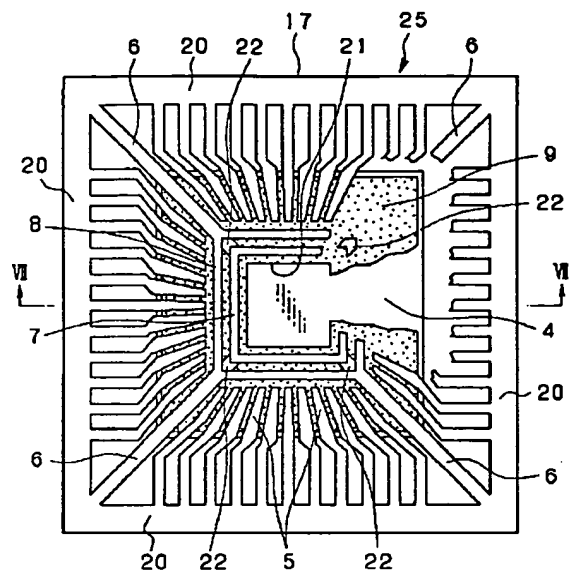
[Drawing 7]



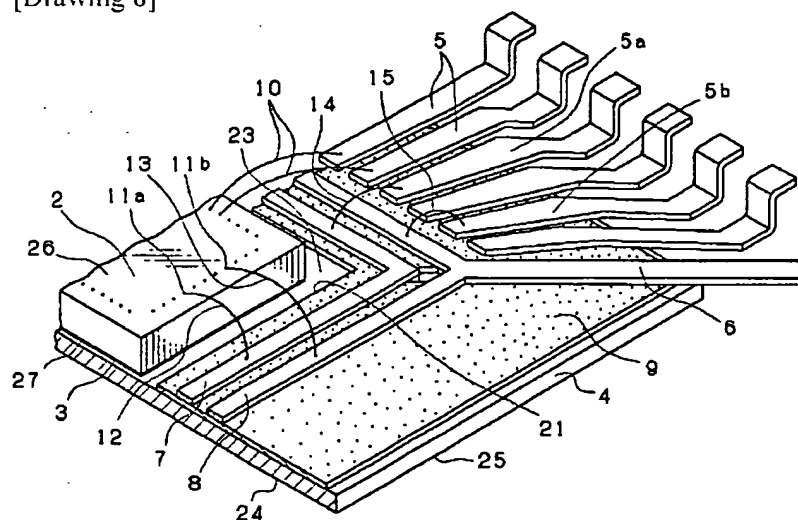
[Drawing 5]



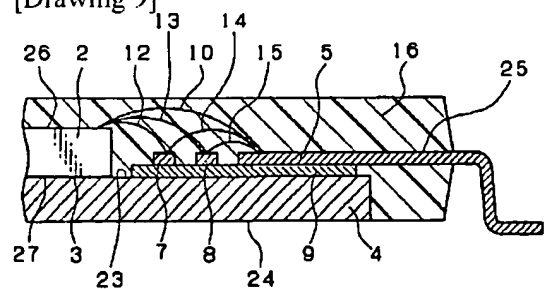
[Drawing 6]



[Drawing 8]



[Drawing 9]



[Translation done.]